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Massachusetts Office of Coastal Zone Management - Wetlands Restoration Program
PURPLE LOOSESTRIFE BIOCONTROL PROJECT SUMMARY
Fall 2007

Project Website: http://www.mass.gov/czm/wrp/projects_pages/loosestrife.htm

This summary document provides background information on the invasive, exotic purple loosestrife plant. It also briefly reviews the use of biocontrol measures in Massachusetts to control purple loosestrife. These measures have been administered since 2000 through a purple loosestrife biocontrol project managed by the Massachusetts Wetlands Restoration Program.



Photo credit: Vermont
Department of Environmental
Conservation.

Background

Purple loosestrife (*Lythrum salicaria*) is an invasive wetland plant originally from Europe and Asia. In the United States, there are no native insect species that control purple loosestrife populations. As a result, the plant spreads rapidly and causes significant negative impacts, including reduced native plant coverage, lower plant diversity, and impaired wildlife habitat.

Viable options for managing purple loosestrife via conventional means (water level management, burning, herbicides, manual removal, and cutting) have proven extremely difficult and impractical on a large scale. An alternative is the biological control of purple loosestrife via intentional introduction of natural predators.

Extensive studies found two beetle species in Europe that feed and breed exclusively on purple loosestrife and that control populations there. These beetles (*Galerucella* sp.) have been extensively tested in the United States since 1986 to assess their safety and efficacy as biocontrol agents, leading to a 1992 approval by the United States Department of Agriculture of their use for biocontrol purposes. Published literature indicates that no significant long-term impacts on native plant species have been observed. The beetles prefer to eat purple loosestrife and will lay eggs only on that plant.

In as little as three years, treatments can have a dramatic impact on purple loosestrife populations. While these natural predators cannot eliminate purple loosestrife entirely, they have been shown to reduce the density of the plant (by up to 90% in some studies) and allow re-establishment of native wetland vegetation. Beetle populations are controlled by purple loosestrife availability and will increase or decrease in proportion with the plant's abundance. When the population of purple loosestrife in a wetland is reduced by effective biocontrol measures, beetle populations will decline as well.

These beetles have been used successfully in the United States to control purple loosestrife infestations since the early 1990s. Treatments have occurred in all of the New England states, including Massachusetts, where beetles were first released on National Wildlife Refuges (Great Meadows NWR and Parker River NWR).

Massachusetts Wetlands Restoration Program – Purple Loosestrife Biocontrol Project

The Massachusetts Wetlands Restoration Program (WRP) initiated a purple loosestrife biocontrol project in 2000. The overall goal of the biocontrol project is to enhance the health, condition, and diversity of habitats and native species within wetlands that have been degraded by purple loosestrife infestations. As of 2007, WRP has facilitated beetle releases at 26 sites in Massachusetts (see Table 1 & Figure 1). Volunteer organizations have been involved in beetle rearing, beetle release, and spring and fall site monitoring. Extensive monitoring of treatment sites has occurred to document the effects of the beetles on purple loosestrife growth and the establishment of beetle populations. Several sites in Massachusetts have shown successful reductions in purple loosestrife coverage and vigor after multiple beetle releases over three to four years (Figures 2 & 3).

WRP coordinates with the Massachusetts Natural Heritage Program and local conservation commissions during the review process for proposed release sites. Conservation commissions are provided with detailed information about the biocontrol program and data specific to sites in their jurisdiction. WRP and local volunteers will continue to monitor selected release sites for three or more years. A summary report of monitoring results is provided to state agencies and the conservation commission in each town where a release has occurred.



Students at Diamond Middle School in Lexington measure the height of purple loosestrife plants in a monitoring quadrat in the fall of 2002.

Future directions

WRP has received funding through a United States Fish and Wildlife Service Cooperative Agreement to support biocontrol project expansion. WRP plans to develop additional partnerships and support the expansion of treatment sites throughout the state. The project will continue to use a volunteer-based model and will partner with schools and conservation organizations to help raise and release beetles and monitor treatment sites. Additionally, WRP is collaborating with government agencies and other partners to develop a long-range strategic plan for the biological control of purple loosestrife throughout Massachusetts.

For additional information on purple loosestrife biocontrol, please see the project website at http://www.mass.gov/czm/wrp/projects_pages/loosestrife.htm or contact Beth Suedmeyer at beth.suedmeyer@state.ma.us or 617-626-4921.

Table 1: WRP facilitated biocontrol treatment sites.

Site Name	Town	Collaborating Organizations	Release Year(s)	Number [#] of Beetles
Great Hill Reserve	Acton	Acton Conservation Commission, Acton Boxborough Regional High Sch.	2001, 2002, 2003, 2004, 2006	35,000
Waring School	Beverly	Waring School	2001, 2002, 2003, 2007	15,000
Mass Audubon Endicott Sanctuary	Beverly/Wenham	Mass Audubon, Glen Urquhart School	2007	5,000
Bolton Flats	Bolton	Department of Fish and Wildlife	2006, 2007	18,000
Chandler Pond	Boston	Pond association	2002, 2003, 2004	15,000
Fresh Pond	Cambridge	Cambridge City Water District	2007	Uncertain*
Great Brook Farm	Carlisle	Department of Conservation and Recreation	2006, 2007	13,000
Archer Meadowbrook Preserve	Chelmsford	Chelmsford Conservation Land Trust	2007	Uncertain*
Great Meadows NWR	Concord/Sudbury	USFWS	Multiple since 1997	Uncertain
Cutler Park	Dedham	No Nasties Stream Team, Dept. of Conservation and Recreation	2006, 2007	17,500
Lake Ripple	Grafton	Grafton Conservation Commission	2007	5,000
Nashua River Rail Trail	Groton	Groton School	2006, 2007	Uncertain*
Diamond School	Lexington	Diamond School	2001, 2002, 2003	25,000
Stebbins Wildlife Refuge	Longmeadow	Local land steward	2000, 2001, 2004	22,000
Lake Garfield	Monterey	Pond association	2004, 2005, 2006	14,500
Sullivan's Ledge Middle Marsh	New Bedford	New Bedford Conservation Commission	2005, 2007	25,000
Weir Hill Reservation	No. Andover	Trustees of Reservations	2006, 2007	Uncertain*
Stony Brook	Norfolk	Mass Audubon, Department of Conservation and Recreation	2006, 2007	14,050
Martins Pond	Reading	Pond association, Merrimack College	2002, 2005, 2006, 2007	Uncertain*
Old Colonial Road	Stockbridge	Berkshire Natural Resource Council	2006, 2007	10,000
Hayes Meadow Conservation Area	Sudbury	Curtis Middle School	2007	Uncertain*
Rice City Pond	Uxbridge	Uxbridge High School	2005, 2006	Uncertain*
West Hill Dam	Uxbridge	US Army Corps of Engineers, Uxbridge High School	2007	5,000
Turners Pond	Walpole	Town of Walpole	2000, 2001, 2002	30,000
Paintshop Pond, Wellesley College	Wellesley	Wellesley College	2007	Uncertain*
Ciriello Property	Woburn	Private landowner	2001, 2002	20,000

Notes: [#] cumulative number of beetles over all release years, * counts uncertain because of difficulty counting reared beetles.

Figure 1: Map of WRP facilitated biocontrol treatment sites



Figure 1: Results from fall monitoring at two treatment sites. Average percent cover and average total number of stems of purple loosestrife for five 1 m² monitoring quadrats at each site. * indicate years with beetle releases.

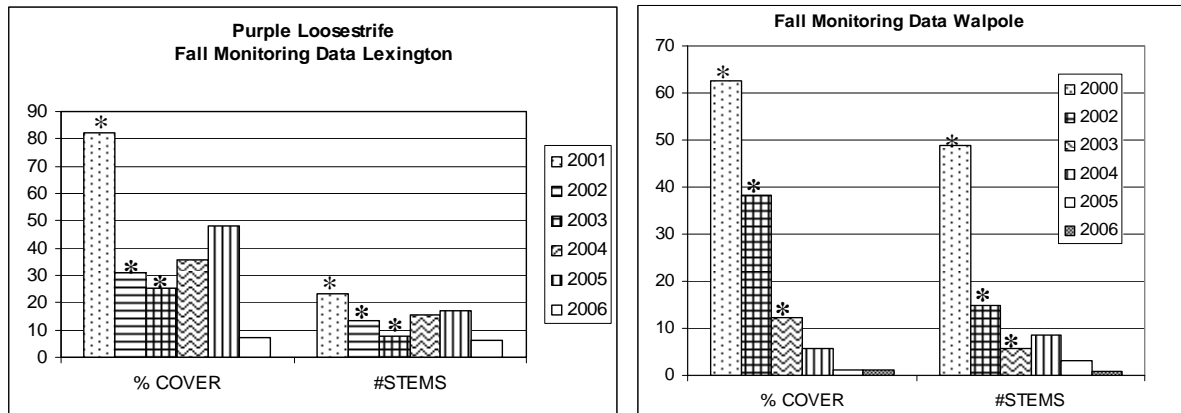


Figure 2: Photo comparison of the Walpole site 2 and 4 years after initial treatment. Purple loosestrife dominates Quadrat #2 in 2002 but is not present in 2004, when native sensitive fern is the dominant plant. Sites like these will continue to be monitored to document the vegetation that colonizes treatment areas following beetle releases.



Quadrat #2, 2002

Quadrat #2, 2004